terrafix®
geosynthetics inc.

TERRAFIX TRIANGULAR GEOGRID
TTX

SUBGRADE IMPROVEMENT
PAVEMENT OPTIMIZATION

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TRIANGULAR GEOGRID TTX

How TTX Geogrids work:

Geogrids are distinguished by the regular network of tensile elements that form openings that are large enough to interlock with the surrounding soil matrix.

Geogrids allow the development of tensile forces with the objective to control deformations within a geotechnical system. For example: a geogrid used to improve the mechanical properties of the base material in a roadway.

Key properties and characteristics:

- Stiffness and resiliency of aggregate and granular fill
- Soil-geosynthetic interaction
- Load distribution
- Rutting resistance under repeated loads
- Bearing capacity and settlement resistance
- Confined stiffness of the soil-geosynthetic system under small displacement

Lower Initial Costs

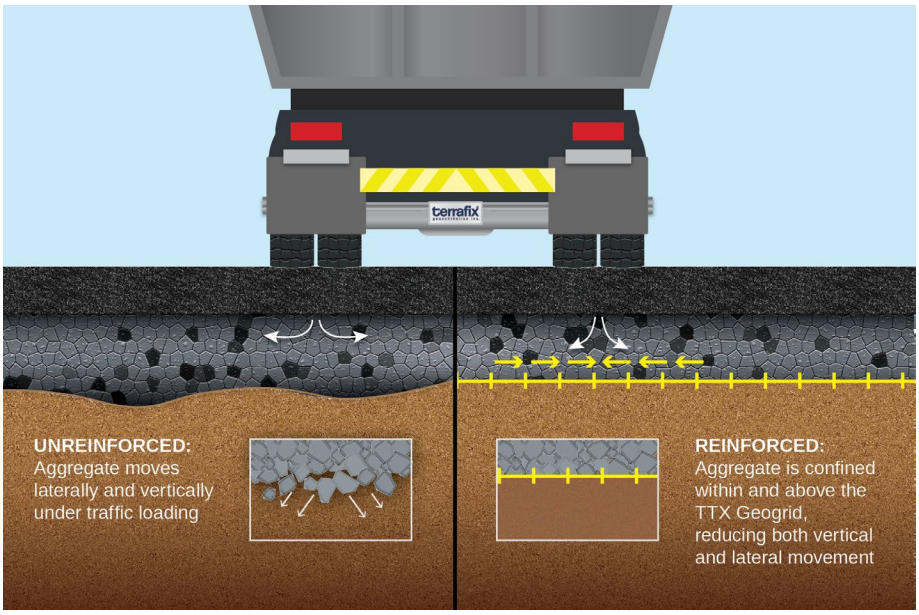
Full scale research indicated that a significant reduction in the pavement component thickness can be achieved with the improvement system.

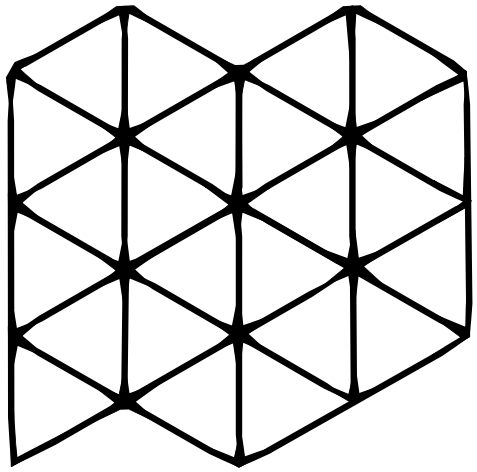
- Reduction of asphalt layer 15–30%
- Reduction of aggregate layer 25–50%

Cost savings are realized through reduction of raw material usage and through hauling and placement charges.

Reduced Life Cycle Costs

Through the unique properties of TTX Geogrids offer engineers, contractors and owners a solution that extends the service life of a pavement structure. In flexible pavement structures, TTX Geogrids are traditionally used to stabilize the aggregate base course layer immediately below the asphalt cement concrete. Studies and research allow the user to accurately predict the performance of geogrid stabilized and unstabilized structures for paved applications.





Design and Build with Confidence

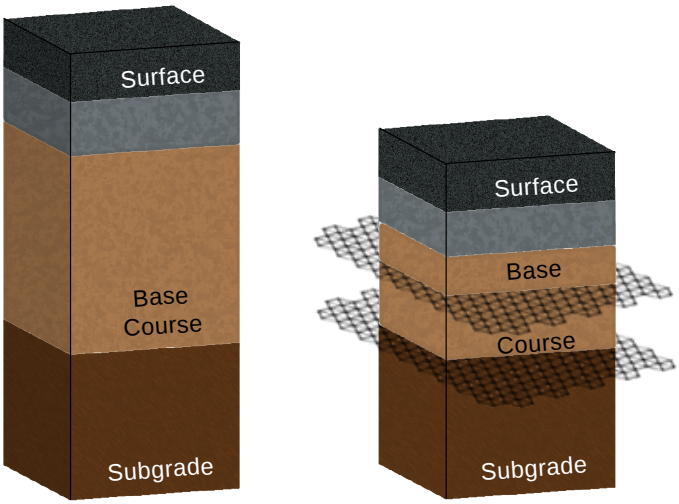
Design and enhance the structural capacity of your sub-base and base course with geogrids. Based on the US Army Corps of Engineers (ETL 1110-1-189) study lateral restraint can :

- Boost confinement of the base course
- Increase in stiffness of the aggregate during repeating loads
- improved/reduced vertical stress distribution applied to pavement subgrade

The interlocking effect also reduces lateral movement which translates in aggregate thickness reduction and rutting/ fatigue cracking reduction

- Increase the service life of pavements
- Cost-effective solution

Due to extensive studies from diverse government agencies, educational/research institutes, and design approaches on AASHTO 93 of the reinforced pavement performance, Terrafix Triaxial Geogrids (TTX) when used in engineered designs will provide the following significant benefits:



- Reduced sub-excavation below paved structures meaning shorter construction times, lower trucking and disposal costs and reduced carbon emission
- Strengthen the pavement design by introducing geogrid on the sub-base and base course without incorporating additional thickness
- Longer life cycles and better performance for paved infrastructure

There are major benefits on Mechanical Stabilized Geogrid on base mechanical stabilization designs. Lower critical pavement responses predicted my mechanistic model linked to longer pavement life. Based on realistic quantification of the aggregate interlock responsible for stiffness enhancement:

TRIANGULAR GEOGRID
TTX / TTX-G160

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TTX - Terrafix Triangular Geogrid		TTX 130S			TTX 160 / TTX-G160			TTX 7		
Property	**ASTM Test Method**									
		Longitudinal	Diagonal	General	Longitudinal	Diagonal	General	Longitudinal	Diagonal	General
Index Properties										
Rib pitch, mm (in)	D4759	33 (1.30)	33 (1.30)		40. (1.60)	40 (1.60)		40 (1.6)	40 (1.6)	
Mid-rib depth, mm (in)	D4759				1.4 (0.06)	1.6 (0.06)		1.6 (0.06)	2.0 (0.08)	
Mid-rib width, mm (in)	D4759				1.2 (0.05)	1.1 (0.04)		1.2 (0.04)	1.1 (0.04)	
Rib Shape	D4759			Rectangular			Rectangular			Rectangular
Aperture Shape	D4759			Triangular			Triangular			Triangular
Mechanical Properties										
Radial Stiffness at 0.05% strain (kn/m)	D7737-11			200			315			390
Radial Stiffness at 2.0 strain (kN/m)	D7737-11			140			225			295
Radial Stiffness Ratio	D6637			0.6			0.65			0.65
Juction Efficiency %	D7737			93			93			93
Resistance to Chemical Degradation	EPA 9090			100%			100%			100%
Resistance to UV Degradation	D4355			70%			70%			70%

TTX-G160 (With Geotextile)	Test Method	Unit	Metric
Grab Tensile Strength	ASTM D4632	kN	0.711
Grab Elongation	ASTM D4632	%	50
Trapezoid Tear Strength	ASTM D4533	kN	0.267
CBR Puncture Resistance	ASTM D6241	kN	1.823
Permittivity	ASTM D4491	sec^{-1}	1.5
Water Flow	ASTM D4491	$L/min/m^2$	4480
Apparent Opening Size (AOS)[5]	ASTM D4751	mm	0.212
UV Resistance (500hrs)	ASTM D4355	%	70
Roll Dimensions, width x length	—	m	3.9 x 50

Geogrid testing values in accordance with **ASTM D4759** (minimum average roll values) in accordance with test methods EOTA TRO41 and ISO 10319 at the temperature of 21±1°C.

ASTM D6637-10 and ASTM D7737-11: Junction efficiency %. Load transfer capability determined in accordance with and expressed as a percentage of ultimate tensile strength.

ASTM D6637-10: radial stiffness at low strain, kN/m @ 0.5% strain (lb/ft @0.5% strain). Radial stiffness is determined from tensile stiffness measured in any in-plane axis.

Stiffness Ratio: The ratio between the minimum and maximum observed values of radial stiffness at 0.5% strain, measured on rib and midway between rib directions.

EPA 9090: Resistance to chemical degradation. Resistance to loss of load capacity or structural integrity when subjected to chemically aggressive environments including acids, alkali's and salts, normally found in soils. Also it is not nutrient, therefore, these products will not be affected by micro-organisms in soil.

ASTM D4355-05: Resistance to ultra-violet light and weathering. Resistance to loss of load capacity of structural integrity when subjected to 500 hours of ultraviolet light and aggressive weathering.

1. Unless indicated otherwise, values shown are minimum average roll values determined in accordance with ASTM D4759-02
2. The ratio between the minimum and maximum observed values of radial stiffness at 0.5% strain, measured on rib and midway between rib directions.
3. Radial stiffness is determined from tensile stiffness measured in any in-plane axis.
4. Nominal dimensions.
5. maximum average roll value.